PS

UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/064,051	06/05/2002	Anchor Chen	NAUP0486USA	9791

27765 7590 06/24/2003

NAIPO (NORTH AMERICA INTERNATIONAL PATENT OFFICE)
P.O. BOX 506
MERRIFIELD, VA 22116

EXAMINER	
LANDAU, MATTHEW C	
ART UNIT	**PAPER NUMBER**
2815	

DATE MAILED: 06/24/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/064,051	CHEN, ANCHOR	
	Examiner	Art Unit	
	Matthew Landau	2815	

-- The MAILING DATE of this communication appears on th cover sh et with the correspondenc address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☐ Responsive to communication(s) filed on _____ .

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) 1-17 is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) 1-17 is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on 05 June 2002 is/are: a)☐ accepted or b)☒ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

11)☐ The proposed drawing correction filed on _____ is: a)☐ approved b)☐ disapproved by the Examiner.

If approved, corrected drawings are required in reply to this Office action.

12)☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

13)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____ .

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

14)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).

a) ☐ The translation of the foreign language provisional application has been received.

15)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____ .
4) ☐ Interview Summary (PTO-413) Paper No(s). _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: .

DETAILED ACTION

Drawings

The drawings are objected to under 37 CFR 1.83(a). The drawings must show every feature of the invention specified in the claims. Therefore, the limitation "the dielectric layer is a shallow isolation trench (STI) oxide layer, and the predetermined region is a STI region" must be shown or the feature(s) canceled from the claim(s). No new matter should be entered.

A proposed drawing correction or corrected drawings are required in reply to the Office action to avoid abandonment of the application. The objection to the drawings will not be held in abeyance.

Claim Rejections - 35 USC § 112

The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

Claims 1 and 11 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

In regards to claim 1, the limitation "intrinsic base doped region" renders the claim indefinite. It is unclear what is meant by this limitation since an intrinsic region is a region with a negligible amount of impurities (undoped).

In regards to claims 1 and 11, the limitation "an emitter conductivity layer being filled with the self-aligned emitter region" renders the claims indefinite. For the purpose of this Office Action, it is considered the self-aligned emitter region is filled with an emitter conductivity layer.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claims 1, 3, 7, 9, 10, 11, 12, and 17 are rejected under 35 U.S.C. 102(b) as being anticipated by Imai.

In regards to claim 1, as best the examiner can ascertain the claimed invention, Figure 2 of Imai discloses a bipolar junction transistor (BJT) comprising: a substrate 14; a dielectric layer (20,16) formed on a predetermined region of the substrate; an opening formed in the dielectric layer, and a portion of the substrate being exposed; a heavily doped polysilicon layer 32 formed on a sidewall of the opening to define a self-aligned base region (32,30a,36) in the opening; an intrinsic base doped region 36 formed within the substrate and in a bottom of the opening; a spacer 34 formed on the heavily doped polysilicon layer to define a self-aligned emitter region in the opening; and the self-aligned emitter region being filled with an emitter conductivity layer (38,40) and a PN junction being formed between the emitter conductivity layer and the intrinsic base doped region (column 4, lines 12-15).

In regards to claim 3, Imai discloses the substrate 14 is silicon (column 3, lines 1-3).

In regards to claim 7, Figure 2 of Imai discloses an extended conductivity layer 22 formed on the dielectric layer (20/16) electrically connected to the heavily doped polysilicon layer.

In regards to claim 9, Imai discloses the extended conductivity layer is composed of in-situ doped polysilicon (column 3, lines 5-15).

In regards to claim 10, Figure 2 of Imai discloses the dielectric layer 16 is a shallow isolation trench (STI) oxide layer, and the predetermined region is a STI region.

In regards to claim 11, Figure 2 of Imai discloses a hetero-junction bipolar junction transistor (HBT) comprising: a substrate 14; a dielectric layer (20,16) formed on a predetermined region of the substrate; an opening formed in the dielectric layer, and a portion of the substrate being exposed; a SiGe epitaxial layer (30a,36) (column 3, lines 39-65) formed on a sidewall and a bottom of the opening; a spacer 34 formed on the SiGe epitaxial layer to define a self-aligned emitter region in the opening; and an emitter conductivity layer (38,40) filling the self-aligned emitter region, and a PN junction being formed between the emitter conductivity layer and the SiGe epitaxial layer (column 4, lines 12-15).

In regards to claim 12, Imai discloses the substrate 14 is silicon (column 3, lines 1-3).

In regards to claim 17, Figure 2 of Imai discloses the dielectric layer 16 is a shallow isolation trench (STI) oxide layer, and the predetermined region is a STI region.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claim 2 is rejected under 35 U.S.C. 103(a) as being unpatentable over Imai in view of Fitch et al. (US Pat. 5,213,989, hereinafter Fitch).

In regards to claim 2, the difference between Imai and the claimed invention is the heavily doped polysilicon layer is doped with a boron dopant. Fitch discloses boron is conventionally used as a p-type dopant (column 7, lines 5-8). The heavily doped region 32 of Imai is p-type. In view of such teaching, it would have been obvious to the ordinary artisan at the time the invention was made to modify the invention of Imai by using boron as the dopant in the heavily doped polysilicon region for the purpose of obtaining a p-type region. A further difference between Imai and the claimed invention is the dosage ranging from 1E19 to 1E21. It would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the invention of by, since it has been held that where the general conditions of a claim are disclosed in the prior art, discovering the optimum or workable ranges involves only routine skill in the art. In re Aller, 105 USPQ 233. The ordinary artisan would have been motivated to modify in the manner described above for the purpose of decreasing resistance of the base electrode.

Claims 4, 5, 13, and 14 are rejected under 35 U.S.C. 103(a) as being unpatentable over Imai in view of Chuang et al. (US PGPub 2003/0096486, hereinafter Chuang).

In regards to claims 4 and 13, the difference between Imai and the claimed invention is the substrate is a non-selective epitaxial substrate. Figure 1A of Chuang discloses a non-selective epitaxial layer 102. In view of such teaching, it would have been obvious to the ordinary artisan at the time the invention was made to modify the invention of Imai by using a non-selective deposition method layer for the epitaxial substrate. The ordinary artisan would have been motivated to modify Imai in the manner described above for the purpose of depositing the epitaxial layer.

In regard to claims 5 and 14, the difference between Imai and the claimed invention is a silicide layer formed on the emitter conductivity layer. Figure 2H of Chuang discloses a silicide layer 222 formed on an emitter conductivity layer 212a. In view of such teaching, it would have been obvious to the ordinary artisan at the time the invention was made to modify the invention of Imai by including a salicide layer on the emitter conductivity layer for the purpose of decreasing the contact resistance.

Claims 6 and 15 are rejected under 35 U.S.C. 103(a) as being unpatentable over Imai in view of Jambotkar.

In regards to claims 6 and 15, the difference between Imai and the claimed invention is a selective implant collector (SIC) region formed in the substrate beneath the intrinsic base doped region. Figure 1B of Jambotkar discloses a SIC region 31 below an intrinsic base region 33. In view of such teaching, it would have been obvious to the ordinary artisan at the time the

invention was made to modify the invention of Imai in the manner described above for the purpose of minimizing the series collector resistance (column 6, lines 66-68).

Claim 8 is rejected under 35 U.S.C. 103(a) as being unpatentable over Imai in view of Oda et al. (US Pat. 6,521,974, hereinafter Oda).

In regards to claim 8, the difference between Imai and the claimed invention is an oxide layer and a silicon nitride layer formed between the extended conductivity layer and the dielectric layer. Figure 1 of Oda discloses an oxide layer 7 and a silicon nitride layer 8 formed between an extended conductivity layer 9 and a dielectric layer 4. In view of such teaching, it would have been obvious to the ordinary artisan at the time the invention was made to modify the invention of Imai by including the oxide and nitride layers of Oda for the purpose of providing additional isolation from the substrate.

Allowable Subject Matter

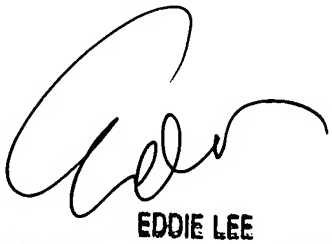
Claim 16 would be allowable if rewritten to overcome the rejection(s) under 35 U.S.C. 112, second paragraph, set forth in this Office action and to include all of the limitations of the base claim and any intervening claims. The following is a statement of reasons for the indication of allowable subject matter: the prior art of record does not disclose or suggest, either singularly or in combination, the SiGe epitaxial layer extending outside the opening and above the dielectric layer.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Matthew C. Landau whose telephone number is (703) 305-4396.

The examiner can normally be reached from 8:00 AM-4: 30 PM. If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Eddie Lee can be reached on (703) 308-1690. The fax phone numbers for the organization where this application or proceeding is assigned are (703) 308-7722 for regular communications and (703) 308-7722 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0956.



EDDIE LEE
SUPERVISORY PATENT EXAMINER
TECHNOLOGY CENTER 2800

Matthew C. Landau

Examiner

June 19, 2003